

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**GRASSED WATERWAY**

(Acre)  
CODE 412

**DEFINITION**

A natural or constructed channel that is shaped or graded to required dimensions and established with suitable vegetation.

**PURPOSES**

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

- to convey runoff from terraces, diversions, or other water concentrations without causing erosion or flooding
- to reduce gully erosion
- to protect/improve water quality.

**CONDITIONS WHERE PRACTICE APPLIES**

In areas where added water conveyance capacity and vegetative protection are needed to control erosion resulting from concentrated runoff and where such control can be achieved by using this practice alone or combined with other conservation practices, and where there is sufficient depth of suitable soil material to maintain an adequate stand of vegetation.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Grassed waterways shall be planned, designed, and constructed to comply with all Federal, State, and local laws and regulations.

**Capacity** The minimum capacity shall be that required to convey the peak runoff expected from a storm of 10-year frequency, 24-hour duration. When the waterway slope is less than 1 percent, out-of-bank flow may be permitted if such flow will not cause excessive erosion. The minimum in such cases shall be equal to or greater than the Q obtained from

the "B" Drainage Curve in Chapter 14 of Part 650 of the National Engineering Handbook.

The vegetal retardance used to determine capacity shall be the maximum expected for the appropriate vegetation and condition.

**Velocity** Design velocities shall not exceed those obtained by using the procedures, "n" values, and recommendations in the NRCS Engineering Field Handbook (EFH) Part 650, Chapter 7, or Agricultural Research Service (ARS) Agricultural Handbook 667, Stability Design of Grass-lined Open Channels. The minimum velocity shall be 1.5 feet per second. If minimum velocities cannot be maintained, consideration should be given to using a drainage field ditch or drainage main or lateral.

**Width** The bottom width of trapezoidal waterways shall not exceed 100 feet unless multiple or divided waterways or other means are provided to control meandering of low flows. Where planned to be crossed by farm equipment, trapezoidal waterways should have a minimum bottom width of 20 feet.

**Side slopes** Side slopes shall not be steeper than a ratio of two horizontal to one vertical. They shall be designed to accommodate the equipment anticipated to be used for maintenance and tillage/harvesting equipment that will cross the waterway. Where planned to be crossed by farm equipment, trapezoidal waterways shall have side slopes of 8:1 or flatter, and parabolic waterways shall have top width to depth ratio (T/d) equal to at least 24.

**Depth** The minimum depth of a waterway that receives water from terraces, diversions, or other tributary channels shall be that required to keep the design water surface elevation at, or below the design water surface elevation in the tributary channel, at their junction when both are flowing at design depth.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.

Freeboard above the designed depth shall be provided when flow must be contained to prevent damage. Freeboard shall be provided above the designed depth when the vegetation has the maximum expected retardance.

**Drainage** Designs for sites having prolonged flows, a high water table, or seepage problems shall include Subsurface Drains (NRCS Practice Code 606), Underground Outlets (NRCS Practice Code 620), Stone Center Waterways or other suitable measures to avoid saturated conditions. Where tile is used along the waterway it should be located as close to 1/3 of the channel top width from the center of the waterway as is practical. The top of the tile should be at least 2.0 feet below the bottom of the waterway, except where soil or outlet conditions make this depth impractical.

**Alignment** Minor changes may be made to improve alignment. Care must be taken to avoid exposing soil materials that are not conducive to the establishment and maintenance of adequate vegetative cover.

**Outlets** All grassed waterways shall have a stable outlet with adequate capacity to prevent ponding or flooding damages. The outlet can be another vegetated channel, an earthen ditch, a grade-stabilization structure, filter strip or other suitable outlet.

**Vegetative Establishment.** Grassed waterways shall be vegetated according to NRCS Conservation Practice Standard Critical Area Planting, Code 342.

Seedbed preparation, time of seeding, mixture rate, stabilizing crop, mulching, or mechanical means of stabilizing, fertilizer, and lime requirements shall be specified for each applicable area.

Establish vegetation as soon as conditions permit. Use mulch anchoring, nurse crop, rock, straw or hay bale dikes, filter fences, or runoff diversion to protect the vegetation until it is established.

## CONSIDERATIONS

Important wildlife habitat, such as woody cover or wetlands, should be avoided or protected if possible when siting the grassed waterway. If trees and shrubs are incorporated, they should be retained or planted in the periphery of

grassed waterways so they do not interfere with hydraulic functions. Mid- or tall bunch grasses and perennial forbs may also be planted along waterway margins to improve wildlife habitat. Waterways with these wildlife features are more beneficial when connecting other habitat types; e.g., riparian areas, wooded tracts and wetlands.

Water-tolerant vegetation may be an alternative on some wet sites.

Provide livestock and vehicular crossings as necessary to prevent damage to the waterway and its vegetation.

Establish filter strips on each side of the waterway to improve water quality.

Add width of appropriate vegetation to the sides of the waterway for wildlife habitat.

Where flow outside of and parallel to the waterway is likely from sediment buildup or farming operations, consider the installation of small “kicker dikes” at regular intervals to force water into the design portion of the waterway.

On steeper waterways, where flows may cause ephemeral erosion to occur prior to vegetative establishment, consider installation of rock or filter fabric “checks” at regular intervals.

## PLANS AND SPECIFICATIONS

Plans and specifications for grassed waterways shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose(s).

## OPERATION AND MAINTENANCE

An operation and maintenance plan shall be provided to and reviewed with the landowner. The plan shall include the following items and others as appropriate:

- A maintenance program shall be established to maintain waterway capacity, vegetative cover, and outlet stability. Vegetation damaged by machinery, herbicides, or erosion must be repaired promptly.

- Seeding shall be protected from concentrated flow and grazing until vegetation is established.
- Minimize damage to vegetation by excluding livestock whenever possible, especially during wet periods.
- Inspect grassed waterways regularly, especially following heavy rains. Damaged areas will be filled, compacted, and seeded immediately. Remove sediment deposits to maintain capacity of grassed waterway.
- Landowners should be advised to avoid areas where forbs have been established when applying herbicides. Avoid using waterways as turn-rows during tillage and cultivation operations. Prescribed burning and mowing may be appropriate to enhance wildlife values, but must be conducted to avoid peak nesting seasons and reduced winter cover.
- Mow or periodically graze vegetation to maintain capacity and reduce sediment deposition.
- Control noxious weeds.
- Do not use as a field road. Avoid crossing with heavy equipment when wet.
- Repair broken tile lines or blowouts adjacent to or in the waterway immediately.

### **Specifications**

All trees, stumps, brush and heavy growth of vegetation shall be removed from the site and disposed of so that they will not interfere with construction or proper functioning of the waterway. They shall not be deposited or buried in a draw.

Where establishment of vegetation is determined to be a serious problem on subsoil, the best available soil will be stockpiled for resspreading over the waterway area after grading.

The soil removed from the waterway or outlet shall be deposited where it will not interfere with the flow of water into the waterway.

Fills shall be compacted as needed to prevent unequal settlement that would cause damage in the completed waterway.

When the waterway is straightened by cutting through a point of a ridge, care must be taken to maintain the proper cross-section.

The waterway will be constructed to width and depth as shown on the plan. The quarter points of parabolic waterways shall be constructed to the required depth plus or minus 0.2 feet. The center shall be the lowest point. The top width of the waterway may exceed the design width by 10%. This additional width must be maintained and vegetated.

The waterway shall be vegetated as soon as possible, using specified materials.